San José State University
Department of Electrical Engineering
EE 160L, Principles of Communication Systems
Laboratory, Fall 2016

<table>
<thead>
<tr>
<th>Instructor:</th>
<th>Robert H. Morelos-Zaragoza</th>
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<tbody>
<tr>
<td>Office Location:</td>
<td>ENGR 373</td>
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<tr>
<td>Telephone:</td>
<td>(408) 924-3879</td>
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<tr>
<td>Office Hours:</td>
<td>TR 15:00 – 16:00</td>
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</table>
| Class Days/Time:    | Monday 18:00 – 20:45 (Section2)  
                       | Wednesday 15:00 – 17:45 (Section 3)  
                       | Friday 9:00-11:45 (Section 4) |
| Classroom:          | E238                        |
| Prerequisite:       | EE 112/110                  |

Course Description


Course Goals and Student Learning Objectives

This laboratory is designed to provide the student with practical demonstrations of the fundamental principles of analog and digital communication systems. The laboratory starts with learning to use the spectrum analyzer. Simple electronic circuits are then used to demonstrate the sampling theorem, amplitude modulation (AM), binary modulation (OOK, ASK and FSK) and power measurements. Each experiment is allocated one or two lab periods (weeks). Students are required to read completely and understand the experiment’s description and material used, and to complete a set of pre-lab calculations. Some of the pre-lab and post-lab calculations require the use of the Matlab software, available in the lab computers.

GE/SJSU Studies Learning Outcomes (LO), if applicable

Upon successful completion of this course, students will be able to:

LO1 Demonstrate an understanding of the fundamentals of Electrical Engineering, including its mathematical and scientific principles, analysis and design.

LO2 Demonstrate the ability to apply the practice of Engineering in real-world problems.
Course Learning Outcomes
Upon successful completion of this course, students will be able to:
LO3 Analyze signals used in communication systems (a)
LO4 Compare components and subsystems used in communication systems (c)
LO5 Perform laboratory based operational and measurement criteria for analog and digital communication systems in both time and frequency domains (b)
LO6 Critically assess the predicted and measured performance of wired and wireless communications systems (a,g)
LO7 Demonstrate the process of spectral translation (downconversion and upconversion) via narrowband signal analysis and filtering. (a)
LO8 Understand the complexity interplay in communication systems, in terms of circuit and component requirements (c)
LO9 Interpret and report on computer-based performance predictions compared to measurements of analog and digital (binary) modulation techniques (b,k)
LO10 Understand the impact of noise on communication system performance (a,e)

Required Texts/Readings
Textbook
EE 160 laboratory notes and manual. (Available in Canvas.)

Classroom Protocol
Students are expected to participate actively. Students will turn their cell phones off or put them on vibrate mode while in the lab. They will not answer their phones in the lab.

Dropping and Adding
Students are responsible for understanding the policies and procedures about add/drops, academic renewal, etc. Information on add/drops are available at http://info.sjsu.edu/web-dbgen/narr/soc-fall/rec-298.html. Information about late drop is available at http://www.sjsu.edu/sac/advising/latedrops/policy/. Students should be aware of the current deadlines and penalties for adding and dropping classes.

Assignments and Grading Policy
Based upon the course enrollment and the number of laboratory stations that are available and functioning, students will be divided into laboratory groups for the experiments. Each student is expected to actively participate in performing each one of the experiments.

Students who have performed the experiment together may submit either individual reports or a single joint report. A student who does not work with the group must submit an individual report. Every student must complete every laboratory assignment in order to receive a grade in the course. Reports are due on the day of the subsequent experiment.
Grades

Pre-lab calculations  25%
Report  75%
Total  100%

Grading Percentage Breakdown

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Grade</th>
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<tbody>
<tr>
<td>90% and above</td>
<td>A</td>
</tr>
<tr>
<td>80% - 89%</td>
<td>B</td>
</tr>
<tr>
<td>70% - 79%</td>
<td>C</td>
</tr>
<tr>
<td>60% - 69%</td>
<td>D</td>
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<tr>
<td>below 60%</td>
<td>F</td>
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Table 1 Laboratory Schedule (Subject to change with fair notice)

<table>
<thead>
<tr>
<th>Experiment</th>
<th>Dates</th>
<th>Topic</th>
<th>Learning Objectives</th>
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<tbody>
<tr>
<td>1</td>
<td>8/26 (F), 8/29 (M), 8/31 (W) 9/2 (F), 9/7 (W), 9/12 (M) 9/14(W), 9/16 (F), 9/19 (M)</td>
<td>Harmonics and intermodulation (Three sessions)</td>
<td>LO3-LO5,LO10</td>
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<td>2</td>
<td>9/21 (W), 9/23 (F), 9/26 (M) 9/28 (W), 9/30 (F), 10/3 (M) 10/5 (W), 10/7 (F), 10/10 (M)</td>
<td>Spectra of periodic and sampled signals (Three sessions)</td>
<td>LO3-LO5,LO7</td>
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<tr>
<td>3</td>
<td>10/12 (W), 10/14 (F), 10/17 (M) 10/19 (W), 10/21 (F), 10/24 (M)</td>
<td>Amplitude modulation: Up-conversion (Two sessions)</td>
<td>LO5- LO6,LO8</td>
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<tr>
<td>4</td>
<td>10/26 (W), 10/28 (F), 10/31 (M) 11/2 (W), 11/4 (F), 11/7 (M)</td>
<td>Amplitude demodulation: Down-conversion (Two sessions)</td>
<td>LO5- LO6,LO8</td>
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<tr>
<td>5</td>
<td>11/9 (W), 11/14 (M), 11/18 (F)</td>
<td>Wireless transmission and power spectral density (one session)</td>
<td>LO6-7,LO9-10</td>
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<tr>
<td>6</td>
<td>11/30 (W), 12/2 (F), 12/5 (M)</td>
<td>Wireless reception and power measurement (one session)</td>
<td>LO9-10</td>
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Note: The laboratory manual, list of parts and datasheets of components used in the experiments are available in Canvas
University Policies

Academic integrity

Students should know that the University’s Academic Integrity Policy is available at http://www.sa.sjsu.edu/download/judicial_affairs/Academic_Integrity_Policy_S07-2.pdf. Your own commitment to learning, as evidenced by your enrollment at San Jose State University and the University’s integrity policy, require you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The website for Student Conduct and Ethical Development is available at http://www.sa.sjsu.edu/judicial_affairs/index.html.

Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person’s ideas without giving proper credit) will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified. If you would like to include in your assignment any material you have submitted, or plan to submit for another class, please note that SJSU’s Academic Policy F06-1 requires approval of instructors.

Campus Policy in Compliance with the American Disabilities Act

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. Presidential Directive 97-03 requires that students with disabilities requesting accommodations must register with the DRC (Disability Resource Center) to establish a record of their disability.

EE Department honor code

The Electrical Engineering Department will enforce the following Honor Code that must be read and accepted by all students.

“I have read the Honor Code and agree with its provisions. My continued enrollment in this course constitutes full acceptance of this code. I will NOT:

- Take an exam in place of someone else, or have someone take an exam in my place,
- Give information or receive information from another person during an exam,
- Use more reference material during an exam than is allowed by the instructor,
- Obtain a copy of an exam prior to the time it is given,
- Alter an exam after it has been graded and then return it to the instructor for re-grading,
- Leave the exam room without returning the exam to the instructor.”

Measures Dealing with Occurrences of Cheating

Department policy mandates that the student or students involved in cheating will receive an “F” on that evaluation instrument (paper, exam, project, homework, etc.) and will be reported to the Department and the University. A student’s second offense in any course will result in a Department recommendation of suspension from the University.